ASSIGNMENT 4

"Mix Design: Concrete and asphalt." Pages 17-1 through 17-22. "Soil Textbook Assignment: Stabilization." Pages 18-1 through 18-9.

Learning Objective: Identify the methods and procedures used in the design of concrete mixtures.

- Concrete mixture proportions are 4-1. determined by which of the following factors?
 - Anticipated weather conditions at the time of placement
 - 2. Anticipated weather conditions during the entire curing process
 - Size and shape of the structure
 - 4. Quantity to be placed
- What factor determines the strength 4-2. and durability of the concrete?
 - 1. Volume of water
 - 2. Volume of cement
 - 3. Water-cement ratio
 - 4. Compressive strength
- 4-3. When considering the exposure conditions and strength requirements using tables 17-1 and 17-2, what water-cement ratio should you use?
 - 1. Higher ratio
 - 2. Lower ratio
 - 3. Average of the appropriate ratios
 - 4. Laboratory obtained ratio
- A concrete wall is 10 inches thick. What is the maximum size of the coarse aggregate that can be used in the mix?
 - 2.0 in
 - 3.5 in 2.
 - 5.0 in 3.
 - 7.5 in
- Fine aggregate is used in a mix for 4-5. which of the following purposes?
 - 1. To increase the strength of the
 - To absorb excess water
 - To increase the workability of the mix
 - 4. To accelerate the hydration process

- Regardless of weather conditions, entrained air should always be used 4-6. in concrete for which of the following purposes?
 - 1. Precast
 - 2. Paving

 - 3. Drainage 4. Foundation Foundation
- 4-7. Concrete that is exposed to moisture or free water before freezing is classified as what type of exposure?

 - Mild
 Moderate
 - 3. Severe
 - 4. Harsh
- 4-8. What method measures the consistency of the concrete mix?
 - Trial batch 1.
 - 1. 2. Workability test
 - 3. Proportions and ratio
 - Slump test
- The size of your trial batch should 4-9. be determined by which of the following factors?
 - 1. Size of the placement
 - 2. Equipment available for placement
 - 3. Number of test samples required
 - 4. Size of the coarse aggregate
- 4-10. The aggregates for your test batch should be in what condition?
 - 1. Oven-dried
 - 2. Saturated, surface-dry
 - 3. Saturated
 - 4. Super saturated
- 4-11. To determine the amount of mixing water needed for a trial batch, you must determine which of the following information?
 - Amount of cement required
 Water-cement ratio
 Desired slump
 All of the above

- Your coarse aggregate has a maximum 4-18. What is the percentage of 4-12. size of 2 inches and a fineness modulus of 3.00. What quantity of coarse aggregate is required for a 1-cubic-yard trial batch?
 - 1,944 lb

 - 2. 2,000 lb 3. 19.44 cu ft 4 20.00 cu ft
 - 20.00 cu ft
- 4-13. You are preparing a l-cubic-foot trial batch with a water-cement ratio of 0.50. The quantity of cement to be used is 23.5 pounds. What is the required quantity of water?
 - 1. 23.50 lb
 - 2. 11.75 lb
 - 0.50 cu ft
 - 0.25 cU ft
- 4-14. You mix a 1-cubic-yard trial batch and the slump is 2 inches more than the desired slump. What action must you take?
 - 1. Add 10 gal of water
 - 2. Decrease your water by 10 lb
 - 3. Decrease your water by 20 lb
 - 4. Add more cement
- 4-15. To determine the absolute volume of coarse aggregate, which of the following information do you require?
 - Maximum aggregate size
 Specific gravity

 - 3. Dry-rodded weight
 - 4. All of the above
- 4-16. When the fineness modulus is not in the tables, what must you do to determine the volume for the coarse aggregate?
 - 1. Use the value that is higher than the aggregate
 - 2. Use the value that is lower than the aggregate
 - 3. Use the average value from the
 - Interpolate to obtain the value
- 4-17. How do you determine the absolute volume of fine aggregate?
 - 1. (Percents of fine aggregate) x (total cement)
 - 27 (Total absolute volume of all other materials)
 - 3. (Absolute volume of coarse aggregatea)-(absolute volume of concrete)
 - of concrete;
 4. (Total volume of all material) x (specific gravity of fines) x

- free-surface moisture in sand that is squeezed and clings together but contains no excess water?
 - 1. 0% to 2%
 - 2. 2% to 4%
 - 3. 5% to 8% 4. 8% to 129
 - 8% to 12%
- 4-19. What is the maximum FSM of gravel?
 - 1. 1%
 - 2. 2%
 - 3. 3%
 - 4. 4%
- 4-20. When you are batching the concrete mix by weight, how do you account for the weight contributed by the FSM?
 - Increase the total weight for the coarse aggregate only by the FSM
 - 2. Decrease the total weight for the fine aggregate only by the
 - 3. Increase the total weight for the aggregates per cubic yard by the FSM
 - 4. Decrease the total weight for the aggregates by the FSM
- 4-21. What adjustment, if any, should be made to water requirements to account for FSM of the aggregates?
 - Increase the amount of water by the FSM
 - 2. Decrease the amount of water by the FSM
 - 3. Decrease the amount of water by the FSM of the fine aggregates only
 - 4. None
 - 4-22. The FA has a 4 percent FSM and the CA has a 2 percent FSM. The original mix design called for the FA to be 1,050 pounds per cubic yard. What is the adjusted weight of the FA for the actual concrete mix?
 - 1. 1,008 lb/cu yd 2. 1,050 lb/cu yd

 - 3. 1,092 lb/cu yd
 - 4. 1,113 lb/cu yd
 - 4-23. You should monitor the moisture content of the aggregates and make appropriate adjustments under which of the following conditions?
 - 1. After periods of dryness
 - 2. After rains
 - 3. After new material is delivered 4. All of the above

- What waste factor, if any, should 4-24. be applied to a concrete estimate of 220 cubic yards?
 - 1.
 - 2. 10%
 - 3. 15%
 - 4. None
- Determine the total number of sacks 4-25. of cement required for a design project that uses a total volume of 180 cubic yard of concrete? (Use 6.5 sacks per cubic yard.)
 - 1. 1,000
 - 2. 1,170
 - 3. 1,240
 - 4. 1,287

Learning Objective: Identify methods and procedures used in the design of bituminous mixtures.

- The objective of bituminous mix 4-26. design is to determine which of the following factors?
 - 1. The most durable mix possible
 - 2. The most workable mix
 - 3. The most economical blend that will meet all specified requirements
 - 4. The most stable mix with the ability to withstand all possible traffic loads
- The aggregate blend must achieve a 4-27. specified gradation. Your trial batches are based on selected percentages from what source?
 - Project specifications
 TM 5-337

 - 3. NAVFAC MO-330
 - 4. U. S. Army Corps of Engineers Pavement Design Manual
- The specification limits for the 4-28. gradation blend are established by 4-35. When you perform the tests for what authority or publication?
 - 1. By project specifications
 - 2. By TM 5-337
 - 3. By NAVFAC MO-330
 - 4. U. S. Army Corps of Engineers
- The final bitumen mix design is 4-29. affected by all of the following variables except the
 - 1. use of mix
 - 2. minimum aggregate size
 - 3. binder
 - 4. loading

- Which of the following data is 4-30. required to prepare the test specimens?
 - 1. Flow
 - 2. Percentage of voids
 - 3. Specific gravity of the aggregates
 - 4. Total mix unit weight

IN ANSWERING QUESTION 4-31, REFER TO TABLE 17-7 IN YOUR TEXTBOOK.

- 4 31What flow rate is acceptable for a surface course that serves as a high-pressure tire pavement?
 - 1. 16 or less
 - 2. 20 or less
 3. 2% 4%
 4. 5% 7%
- 4-32 When verifying the test results with the criteria for a particular property, you should use the OAC from that particular test only.
 - 1. True
 - 2. False
- 4-33 The Marshall test method requires no special modification until the 1-inch plus aggregate exceeds what percentage of the total aggregate?
 - 5%
 - 1. 5% 2. 7%
 - 3. 10%
 - 4. 12%
- 4-34. You have determined the optimum bitumen content to be 5.5 percent. The aggregate will be what percentage of the mix?
 - 100.0%
 - 2. 97.8%
 - 94.5% 3.
 - 4. 89.0%
- cold-mix asphalts, what is the maximum moisture content of the aggregate by weight?

 - 1. 1% 2. 2% 3. 5% 4. 7%

Learning Objective: Identify the general methods of soil stabilization.

- 4-36. Which of the following methods is a 4-42. general method used for soil stabilization?
 - Modification
 - 2. Additive
 - 3. Cementing
 - 4. Bituminous
- The method of soil stabilization to 4-37. be used is determined by which of the following factors?

 - Soil description
 Soil classification
 Transf of required 3. Amount of required stabilization
 - 4. Each of the above
- 4-38. The mechanical method of soil stabilization is accomplished by mixing what materials?

 - 2. Cement and soil
 - 3. Bituminous products and soil
 - 4. Each of the above
- 4-39. Additives are used for what primary purpose?
 - To improve soil strength only
 - 2. To improve soil durability only
 - 3. To reduce the thickness required only
 - 4. To improve soil quality
- When stabilization is achieved by 4-40. cementing, the final strength depends on which of the following factors?
 - 1. Amount of cement used
 - 2. Density achieved during curing
 - 3. Density achieved during compaction
 - 4. Both 2 and 3 above

Learning Objective: Identify types of stabilizers and the methods used for determining the type and the amount of stabilizer required.

- Which of the following tests must 4-41. be performed before a stabilizer can be selected?
 - 1. Moisture content
 - 2. Sieve analysis
 - 3. Specific gravity
 - 4. Bearing tests

- Cement can be used with coarse-grained soils that meet what criteria?
 - At least 45% retained on a No. 4 sieve
 - 2. At least 45% passing a No. 4 sieve
 - 3. At least 45% retained on a No. 40 sieve
 - 4. At least 45% passing a No. 40 sieve
- 4-43. Plasticity index should meet what criteria when you use a bituminous material for soil stabilization?
 - 1. Greater than 30
 - 2. Less than 30 but greater than 10
 - Equal to 25
 - 4. Less than 10
- 1. Soils of different gradations 4-44. When you choose a stabilizer additive, which of the following factors must be considered?
 - Environmental conditions 1.

 - 2. Cost 3. Type Type of soil quality improvement desired
 - 4. Each of the above
 - 4-45. Plastic soil-cement is used for which of the following purposes?
 - 1. Road repairs
 - 2. Erosion prevention

 - 3. Paving ditches4. Each of the above
 - 4-46. When you add cement to the soil, which of the following properties increases ?
 - 1. Plasticity
 - Water-holding capacity
 All properties
 Bearing capacity

 - 4-47. Water is used in soil-cement for what purpose?

 - For hydration of the cement
 To obtain maximum compaction
 Both 1 and 2 above

 - To increase the weight
 - 4-48. Soils used for soil-cement must be well graded to provide proper aggregate cohesion.
 - 1. True 2. False

- Which of the following soils is the 4-49. most desirable for soil-cement construction?
 - Silty and clayey soil that contains a relatively high percentage of clay
 - Sandy soil that is deficient in fines
 - Sandy and gravelly soil with more than 55% passing a No. 4 sieve
 - Sandy and gravelly soil that contains 10% to 35% silt and clav
- 4-50. What is the first requirement for quality soil-cement?
 - Proper moisture content
 - Adequate cement content
 - Density of the soil
 - 4. Proper compacting equipment
- 4-51. When you perform laboratory tests, composite samples should not be used because they could provide misleading and inaccurate results.
 - True
 - 2. False
- 4-52. The required cement content for nonfrost areas is determined by which of the following tests?
 - Moisture-density
 - Freeze-thaw
 - 3. Wet-dry
 - 4. Both 2 and 3 above
- 4-53. The wet-dry test takes approximately how long to complete?
 - 1 1 day
 - 2. 2 days
 - 3. 24 days
 - 4 108 days
- 4-54. Your sample is classified as a gravelly soil. What is the passing criteria for this type of soil when the freeze-thaw test has been performed on the sample?
 - At least 7% weight loss
 - 2. Not more than $7\frac{1}{8}$ weight loss
 - 3. At least 14% weight loss
 - 4. Not more than 14% weight loss

- 4-55. The principle requirement of a soil-cement mixture is to withstand exposure to the weather. By meeting this requirement, another requirement is also met. What is that other requirement?
 - 1 Strength
 - 2. Moisture content
 - Plasticity 3.
- The use of bitumen has which of the 4-56. following effects on the soil?
 - Decreases the load-bearing capacity
 - Decreases cohesion
 - Increases the resistant to water action
 - Each of the above
- 4-57. In frost areas, tar is the recommended bituminous binder.
 - 1 True
 - 2. False
- 4-58. When pollution control concerns exist, what type of bituminous product is recommended?
 - Asphalt cement
 - 2. Asphalt emulsion
 - 3. Tar
 - 4. Cutback asphalt
- 4-59. For a well-graded aggregate with little to no mineral filler, which of the following bituminous materials should you use?
 - 1. MC-3000
 - 2. MC-250
 - 3. SS-1h 4. SC-70

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